What is Claimed is:

1. A powder batch comprising gold particles, wherein said particles are substantially spherical, have a weight average particle size of not greater than about 5 μm and a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size and wherein said particles comprise crystallites having an average crystallite size of at least about 40 nanometers.

2. A powder batch as recited in Claim 1, wherein said particles comprise at least about 50 weight percent gold metal.

3. A powder batch as recited in Claim 1, wherein said particles comprise at least about 80 weight percent gold metal.

4. A powder batch as recited in Claim 1, wherein at least about 95 weight percent of said metal particles are not larger than twice said average particle size.

5. A powder batch as recited in Claim 1, wherein at least about 90 weight percent of said metal particles are not larger than 1.5 times said average particle size.

6. A powder batch as recited in Claim 1, wherein at least about 95 weight percent of said metal particles are not larger than 1.5 times said average particle size.

7. A powder batch as recited in Claim 1, wherein said average crystallite size is at least about 20 percent of said average particle size.

8. A powder batch as recited in Claim 1, wherein said average crystallite size is at least about 40 percent of said average particle size.

9. A powder batch as recited in Claim 1, wherein said average crystallite size is at least about 60 nanometers.

10. A powder batch as recited in Claim 1, wherein said average crystallite size is at least about 100 nanometers.

104. A method for the production of gold metal particles, comprising the steps of:

a) generating an aerosol of droplets from a liquid wherein said liquid comprises a gold metal precursor and wherein said droplets have a size distribution such that at least about 80 weight percent of said droplets have a size of from about 1 μm to about 5 μm;

b) moving said droplets in a carrier gas; and

c) heating said droplets to remove liquid therefrom and form gold metal particles comprising at least about 50 weight percent gold metal.

~~105.~~ A method as recited in Claim ~~104,~~ wherein said carrier gas is air.

~~106.~~ A method as recited in Claim ~~104,~~ wherein said heating step comprises passing said droplets through a heating zone having a temperature of not greater than about 1065° C.

~~107.~~ A method as recited in Claim ~~104,~~ wherein said heating step comprises passing said droplets through a heating zone having a temperature of from about 450° C to about 750°C.

~~108.~~ A method as recited in Claim ~~104,~~ wherein said metal particles have a particle density of at least about 15.9 g/cm^3.

~~109.~~ A method as recited in Claim ~~104,~~ wherein said metal particles have a particle density of at least about 17.4 g/cm^3.

~~110.~~ A method as recited in Claim ~~104,~~ wherein said droplets in said aerosol have a size distribution such that no greater than about 20 weight percent of the droplets in said aerosol are larger than about twice the weight average droplet size.

111. A method as recited in Claim 104, further comprising the step of removing a portion of droplets from said aerosol, wherein said removed droplets have an aerodynamic

diameter greater than a preselected ~~maximum~~ diameter.

8 ~~112.~~ A method as recited in Claim ~~104~~, further comprising the step of removing a second portion of said droplets from said aerosol, wherein said second portion of droplets have an aerodynamic diameter less than a preselected minimum diameter.

9 ~~113.~~ A method as recited in Claim ~~104~~, wherein said liquid is a solution comprising a gold metal precursor selected from the group consisting of gold nitrate, gold chloride, gold sulfate and gold oxalate.

10 ~~114.~~ A method as recited in Claim ~~104~~, wherein said liquid is a solution comprising gold chloride.

11 ~~115.~~ A method as recited in Claim ~~104~~, wherein said liquid comprises a precursor for at least one metal alloying element.

12 ~~116.~~ A method as recited in Claim ~~104~~, wherein said liquid comprises a precursor for at least one metal alloying element selected from the group consisting of palladium, silver, nickel, copper and platinum.

13 ~~117.~~ A method as recited in Claim ~~104~~, further comprising the step of coating an outer surface of said gold metal particles.

14 ~~118.~~ A method as recited in Claim ~~104~~, further comprising the step of coating an outer surface of said gold metal particles with a metal oxide coating.

15 ~~119.~~ A method as recited in Claim ~~104~~, further comprising the step of coating an outer surface of said gold metal particles with an organic coating.

16 ~~120.~~ A method as recited in Claim ~~104~~, wherein said gold metal particles further comprise a non-metallic phase.

17 ~~121.~~ A method as recited in Claim ~~104~~, wherein said gold metal particles further comprise a metal oxide phase.

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~~122.~~ A method for the production of composite metal particles, comprising the steps of:

a) forming a liquid solution comprising a gold metal precursor and a non-metallic second phase precursor;

b) generating an aerosol of droplets from said liquid solution;

c) moving said droplets in a carrier gas;

d) heating said droplets to remove liquid therefrom and form metal composite particles comprising gold metal and a non-metallic second phase.

19 ~~123.~~ A method as recited in Claim ~~122,~~ 18 wherein said carrier gas comprises air.

20 ~~124.~~ A method as recited in Claim ~~122,~~ 18 wherein said heating step comprises passing said droplets through a heating zone having a temperature of less than about 1065°C.

21 ~~125.~~ A method as recited in Claim ~~122,~~ 18 wherein said heating step comprises passing said droplets through a heating zone having a temperature of from about 450° C to about 750° C.

22 ~~126.~~ A method as recited in Claim ~~122,~~ 18 wherein said metal particles have a particle density of at least about 90 percent of the theoretical density for said composite particles.

23 ~~127.~~ A method as recited in Claim ~~122,~~ 18 wherein said aerosol droplets have an average size of from about 1 μm to about 5 μm and wherein not greater than about 20 weight percent of said droplets have a size greater than about twice said average droplet size.

24 ~~128.~~ A method as recited in Claim ~~122,~~ 18 further comprising the step of removing at least a first portion of droplets from said aerosol wherein said droplets in said removed first portion have an aerodynamic diameter greater than a preselected maximum diameter.

25 ~~129.~~ A method as recited in Claim ~~122,~~ 18 further comprising the step of removing a second portion of said droplets from said aerosol, wherein said droplets in said removed

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second portion have an aerodynamic diameter less than a preselected minimum diameter.

26 ~~130.~~ A method as recited in Claim ~~122~~ 18, wherein said gold metal precursor is selected from the group consisting of gold nitrate, gold hydroxide, gold chloride, gold sulfate and gold oxalate.

27 ~~131.~~ A method as recited in Claim ~~122~~ 18, wherein said gold metal precursor is gold chloride.

28 ~~132.~~ A method as recited in Claim ~~122~~ 18, wherein said non-metallic second phase precursor comprises a metal salt dissolved in said liquid solution.

29 ~~133.~~ A method as recited in Claim ~~122~~ 18, wherein said non-metallic second phase precursor comprises a colloidal suspension.

30 ~~134.~~ A method as recited in Claim ~~122~~ 18, wherein said non-metallic second phase is a metal oxide.

31 ~~135.~~ A method as recited in Claim ~~122~~ 18, wherein said non-metallic second phase is a metal oxide selected from the group consisting of NiO, SiO_2, Cu_2O, CuO, B_2O_3, TiO_2, ZrO_2, Bi_2O_3, PbO, SnO_2, CeO_2, Ce_2O_3, V_2O_5 and Al_2O_3.

32 ~~136.~~ A method as recited in Claim ~~122~~ 18, wherein said composite metal particles comprise gold metal and from about 0.2 to about 35 weight percentof a non-metallic second phase.

33 ~~137.~~ A method as recited in Claim ~~122~~ 18, further comprising the step of coating an outer surface of said composite metal particles.

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~~138.~~ A method for the production of metal alloy particles, comprising the steps of:

a) forming a liquid solution comprising a gold metal precursor and a second metal precursor;

b) generating an aerosol of droplets from said liquid solution;

c) moving said droplets in a carrier gas;

d) heating said droplets to remove liquid therefrom and form metal alloy particles comprising gold metal and a second metal.

35 ~~139.~~ A method as recited in Claim ~~138~~ 34, wherein said carrier gas comprises air.

36 ~~140.~~ A method as recited in Claim ~~138~~ 34, wherein said heating step comprises passing said droplets through a heating zone having a temperature of less than about 1065° C.

37 ~~141.~~ A method as recited in Claim ~~138~~ 34, wherein said heating step comprises passing said droplets through a heating zone having a temperature of from about 450° C to about 750° C.

38 ~~142.~~ A method as recited in Claim ~~138~~ 34, wherein said metal alloy particles have a particle density of at least about 90 percent of the theoretical density for said metal alloy particles.

39 ~~143.~~ A method as recited in Claim ~~138~~ 34, wherein said aerosol droplets have an average droplet size of from about 1 μm to about 5 μm and wherein not greater than about 20 weight percent of said droplets have a size greater than about twice said average droplet size.

40 ~~144.~~ A method as recited in Claim ~~138~~ 34, further comprising the step of removing at least a first portion of droplets from said aerosol wherein said droplets in said removed first portion have an aerodynamic diameter greater than a preselected maximum diameter.

41 ~~145.~~ A method as recited in Claim ~~138~~ 34, further comprising the step of removing a

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second portion of said droplets from said aerosol, wherein said droplets in said removed second portion have an aerodynamic diameter less than a preselected minimum diameter.

42 34
~~146.~~ A method as recited in Claim ~~138,~~ wherein said gold metal precursor is selected from the group consisting of gold nitrate, gold chloride, gold sulfate and gold oxalate.

43 34
~~147.~~ A method as recited in Claim ~~138,~~ wherein said gold metal precursor is gold chloride.

44 34
~~148.~~ A method as recited in Claim ~~138,~~ wherein said second metal phase is selected from the group consisting of palladium, silver, nickel, copper, tungsten, molybdenum, tin and platinum.

45 34
~~149.~~ A method as recited in Claim ~~138,~~ wherein said second metal phase is selected from the group consisting of palladium and platinum.

46 34
~~150.~~ A method as recited in Claim ~~138,~~ wherein said metal alloy particles comprise gold metal and up to about 40 weight percent of said second metal phase.

47 34
~~151.~~ A method as recited in Claim ~~138,~~ wherein said metal alloy particles are homogeneously alloyed with substantially no phase segregation of said gold metal and said second metal.

48 34
~~152.~~ A method as recited in Claim ~~138,~~ further comprising the step of coating an outer surface of said metal alloy particles.

49

~~153.~~ A method for the production of coated metal particles, comprising the steps of:

a) forming a liquid solution comprising a gold metal precursor;

b) generating an aerosol of droplets from said liquid solution;

c) moving said droplets in a carrier gas;

d) heating said droplets to remove liquid therefrom and form metal particles comprising gold metal; and

e) coating an outer surface of said gold metal particles.

50 49

~~154.~~ A method as recited in Claim ~~153~~ wherein said coating step comprises contacting said metal particles with a volatile coating precursor.

51 49

~~155.~~ A method as recited in Claim ~~153~~ wherein said coating step comprises contacting said metal particles with a volatile coating precursor selected from the group consisting of metal chlorides, metal acetates and metal alkoxides.

52 49

~~156.~~ A method as recited in Claim ~~153~~ wherein said carrier gas comprises hydrogen.

53 49

~~157.~~ A method as recited in Claim ~~153~~ wherein said heating step comprises passing said droplets through a heating zone having a temperature of not greater than about 1065° C.

54 49

~~158.~~ A method as recited in Claim ~~153~~ wherein said heating step comprises passing said droplets through a heating zone having a temperature of from about 450° C to about 750° C.

55 49

~~159.~~ A method as recited in Claim ~~153~~ wherein said metal particles have a particle density of at least about 90 percent of the theoretical density for said metal particles.

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~~160.~~ A method as recited in Claim ~~153~~ wherein said aerosol droplets have an average size of from about 1 μm to about 5 μm and wherein not greater than about 20 weight percent of said droplets have a size greater than about twice said average droplet size.

57 ~~161.~~ A method as recited in Claim ~~153~~ 49, further comprising the step of removing at least a first portion of droplets from said aerosol wherein said droplets in said removed first portion have an aerodynamic diameter greater than a preselected maximum diameter.

58 ~~162.~~ A method as recited in Claim ~~153~~ 49, further comprising the step of removing a second portion of said droplets from said aerosol, wherein said droplets in said removed second portion have an aerodynamic diameter less than a preselected minimum diameter.

59 ~~163.~~ A method as recited in Claim ~~153~~ 49, wherein said gold metal precursor is selected from the group consisting of gold nitrate, gold chloride, gold sulfate and gold oxalate.

60 ~~164.~~ A method as recited in Claim ~~153~~ 49, wherein said gold metal precursor is gold chloride.

61 ~~165.~~ A method as recited in Claim ~~153~~ 49, wherein said coating is a metal oxide.

62 ~~166.~~ A method as recited in Claim ~~153~~ 49, wherein said coating has an average thickness of not greater than about 100 nanometers.

63 ~~167.~~ A method as recited in Claim ~~153~~ 49, wherein said coating is a metal oxide selected from the group consisting of SiO_2, Al_2O_3, ZrO_2, B_2O_5, TiO_2, Cu_2O, CuO, PbO, SnO_2, CeO_2, Ce_2O_3, V_2O_5 and Bi_2O_3.

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11. A powder batch as recited in Claim 1, wherein said particles have a particle density of at least about 15.9 g/cm^3.

12. A powder batch as recited in Claim 1, wherein said particles have a particle density of at least about 17.4 g/cm^3.

13. A powder batch as recited in Claim 1, wherein said particles have a particle density of at least about 18.3 g/cm^3.

14. A powder batch as recited in Claim 1, wherein said average particle size is from about 0.1 μm to about 3 μm.

15. A powder batch as recited in Claim 1, wherein said average particle size is from about 0.3 μm to about 1.5 μm.

16. A powder batch as recited in Claim 1, wherein not greater than about 1 weight percent of said particles are in the form of hard agglomerates.

17. A powder batch as recited in Claim 1, wherein said particles comprise a substantially uniform coating substantially encapsulating an outer surface thereof.

18. A powder batch as recited in Claim 1, wherein said particles are metal composite particles comprising a non-metallic phase dispersed throughout a metal phase.

19. A powder batch as recited in Claim 1, wherein said particles are metal composite particles comprising a metal oxide dispersed throughout a metal phase.

20. A powder batch as recited in Claim 1, wherein said powder batch has a specific surface area of not greater than about 3 m^2/g.

21. A powder batch as recited in Claim 1, wherein said particles comprise no more than about 0.1 atomic percent impurities.

22. A powder batch comprising gold metal particles, wherein said metal particles comprise at least about 50 weight percent gold metal and wherein said metal particles have a weight average particle size of from about 0.3 μm to about 3 μm and wherein said metal particles comprise metal crystallites having an average crystallite size of at least about 40 nanometers and said particles have a particle density of at least about 17.4 g/cm^3.

23. A powder batch as recited in Claim 22, wherein said metal particles comprise at least about 90 weight percent gold metal.

24. A powder batch as recited in Claim 22, wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

25. A powder batch as recited in Claim 22, wherein said particle density is at least about 18.3 g/cm^3.

26. A powder batch as recited in Claim 22, wherein said particles are substantially spherical.

27. A powder batch as recited in Claim 22, wherein said average crystallite size is at least about 60 nanometers.

28. A powder batch comprising metal alloy particles, said metal alloy particles comprising gold metal and at least a first metal alloying element, wherein said metal alloy particles have a weight average particle size of from about 0.1 μm to about 5 μm and a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

29. A powder batch as recited in Claim 28, wherein said particles are substantially spherical.

30. A powder batch as recited in Claim 28, wherein said first metal alloying element is selected from the group consisting of palladium, silver, nickel, copper, tungsten, molybdenum, tin and platinum.

31. A powder batch as recited in Claim 28, wherein said first metal alloying element is selected from platinum and palladium.

32. A powder batch as recited in Claim 28, wherein said metal alloy particles comprise at least about 50 weight percent gold metal and said first metal alloying element is homogeneously alloyed with said gold metal with substantially no phase segregation.

33. A powder batch as recited in Claim 28, wherein said metal alloy particles comprise from about 1 to about 40 weight percent of said first metal alloying element.

34. A powder batch as recited in Claim 28, wherein said metal alloy particles comprise from about 1 to about 15 weight percent of said first metal alloying element.

35. A powder batch as recited in Claim 28, wherein said average particle size is from about 0.3 μm to about 1.5 μm.

36. A powder batch as recited in Claim 28, wherein said metal alloy particles comprise crystallites having an average crystallite size of at least about 40 nanometers.

37. A powder batch as recited in Claim 28, wherein said metal alloy particles

comprise crystallites having an average crystallite size of at least about 60 nanometers.

38. A powder batch as recited in Claim 28, wherein said metal alloy particles comprise crystallites having an average crystallite size that is at least about 20 percent of said average particle size.

39. A powder batch as recited in Claim 28, wherein said metal alloy particles have a lower sintering temperature than pure gold metal particles.

40. A powder batch as recited in Claim 28, wherein said metal alloy particles have a higher sintering temperature than pure gold metal particles.

41. A powder batch comprising coated metal particles, said metal particles comprising at least about 50 weight percent gold metal and having a weight average particle size of not greater than about 5 μm and further comprising at least a first coating substantially encapsulating an outer surface of said particles.

42. A powder batch as recited in Claim 41, wherein said coated metal particles comprise crystallites having an average crystallite size that is at least about 20 percent of said average particle size.

43. A powder batch as recited in Claim 41, wherein said average particle size is not greater than about 3 μm.

44. A powder batch as recited in Claim 41, wherein said average particle size is from about 0.3 μm to about 1.5 μm.

45. A powder batch as recited in Claim 41, wherein said coated metal particles have a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

46. A powder batch as recited in Claim 41, wherein said coated metal particles have a particle size distribution wherein at least about 95 weight percent of said particles are not larger than twice said average particle size.

47. A powder batch as recited in Claim 41, wherein said coated metal particles are substantially spherical.

48. A powder batch as recited in Claim 41, wherein said first coating has an average thickness of not greater than about 100 nanometers.

49. A powder batch as recited in Claim 41, wherein said first coating comprises a metal oxide.

50. A powder batch as recited in Claim 41, wherein said first coating comprises a

metal oxide selected from the group consisting of ZrO_2, NiO, SiO_2, B_2O_5, TiO_2, Cu_2O, CuO, Bi_2O_3, PbO, SnO_2, CeO_2, Ce_2O_3, V_2O_5 and Al_2O_3.

51. A powder batch as recited in Claim 41, wherein said first coating comprises a metal.

52. A powder batch as recited in Claim 41, wherein said first coating comprises an organic compound.

53. A powder batch as recited in Claim 41, wherein said first coating is a particulate coating.

54. A powder batch as recited in Claim 41, wherein said first coating is a non-particulate coating.

55. A powder batch as recited in Claim 41, wherein said first coating increases the sintering temperature of said metal particles.

56. A powder batch as recited in Claim 41, wherein said first coating improves the dispersibility of said metal particles in a thick film paste.

57. A powder batch comprising metal composite particles, said composite particles having a weight average particle size of not greater than about 5 μm and a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size, wherein said particles comprise a metal phase having at least about 50 weight percent gold metal and further comprise at least a first non-metallic phase.

58. A powder batch as recited in Claim 57, wherein said first non-metallic phase is dispersed throughout said metal phase.

59. A powder batch as recited in Claim 57, wherein said composite particles are substantially spherical.

60. A powder batch as recited in Claim 57, wherein said composite particles have an average particle size of not greater than about 3 μm.

61. A powder batch as recited in Claim 57, wherein at least about 95 weight percent of said composite particles are not larger than twice said average particle size.

62. A powder batch as recited in Claim 57, wherein said metal phase comprises crystallites having an average crystallite size of at least about 40 nanometers.

63. A powder batch as recited in Claim 57, wherein said first non-metallic phase comprises a metal oxide.

64. A powder batch as recited in Claim 57, wherein said first non-metallic phase comprises a metal oxide selected from the group consisting of NiO, SiO_2, Cu_2O, CuO, B_2O_3, TiO_2, ZrO_2, Bi_2O_3, PbO, SnO_2, CeO_2, Ce_2O_3, V_2O_5 and Al_2O_3.

65. A powder batch as recited in Claim 57, wherein said first non-metallic phase is Al_2O_3.

66. A powder batch as recited in Claim 57, wherein said first non-metallic phase is a dielectric compound selected from the group consisting of titanates, zirconates, silicates,

aluminates, tantalates and niobates.

67. A powder batch as recited in Claim 57, wherein said composite particles comprise at least about 0.1 weight percent of said first non-metallic phase.

68. A powder batch as recited in Claim 57, wherein said composite particles comprise from about 0.2 to about 35 weight percent of said first non-metallic phase.

69. A powder batch as recited in Claim 57, wherein said composite particles comprise from about 0.2 to about 5 weight percent of said first non-metallic phase.

70. A powder batch as recited in Claim 57, wherein said composite particles have a higher sintering temperature than pure gold metal particles.

71. A powder batch as recited in Claim 57, wherein said first non-metallic phase is carbon.

72. A thick-film paste composition suitable for screen printing onto a substrate, comprising:

a) a binder phase;

b) an organic vehicle phase; and

c) a functional phase, said functional phase comprising gold metal particles, wherein said gold metal particles have a weight average particle size of not greater than about 5 μm and an average crystallite size of at least about 40 nanometers.

73. A paste composition as recited in Claim 72, wherein said gold metal particles have a particle size distribution wherein at least about 90 weight percent of said metal particles are not larger than twice said average particle size.

74. A paste composition as recited in Claim 72, wherein said particles are substantially spherical.

75. A paste composition as recited in Claim 72, wherein said average particle size is from about 0.3 μm to about 1.5 μm.

76. A paste composition as recited in Claim 72, wherein said binder phase comprises a glass frit.

77. A paste composition as recited in Claim 72, wherein said organic vehicle phase comprises a polymer dissolved in a solvent.

78. A paste composition as recited in Claim 72, wherein said organic vehicle phase comprises a polymer dissolved in a solvent, wherein said polymer is selected from the group consisting of ethyl cellulose, polyvinyl acetate and acrylic resin and said solvent is selected from the group consisting of terpineol, butyl carbitol, butyl carbitol acetate, kerosene, mineral spirits, dibutylphthalate, hexylene glycol and alcohols.

79. A paste composition as recited in Claim 72, wherein said paste composition

comprises from about 5 to about 95 weight percent of said gold metal particles.

80. A paste composition as recited in Claim 72, wherein said paste composition comprises from about 60 to about 85 weight percent of said gold metal particles.

81. A paste composition as recited in Claim 72, wherein said gold metal particles are composite particles comprising a gold metal phase and a non-metallic phase.

82. A paste composition as recited in Claim 72, wherein said gold metal particles are composite particles comprising a gold metal phase and a metal oxide dispersed throughout said gold metal phase.

83. A paste composition as recited in Claim 72, wherein said gold metal particles are coated particles comprising a coating substantially encapsulating said particles.

84. A thick-film paste composition suitable for screen printing onto a substrate, comprising:

a) a binder phase;

b) an organic vehicle phase; and

c) a functional phase, said functional phase comprising composite metal particles having a weight average particle size of not greater than about 5 μm, said particles comprising a metal phase having at least about 50 weight percent gold metal and further comprising at least a first non-metallic phase.

85. A paste composition as recited in Claim 84, wherein said composite metal particles have a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

86. A paste composition as recited in Claim 84, wherein said particles are substantially spherical.

87. A paste composition as recited in Claim 84, wherein said metal phase comprises at least about 90 weight percent gold metal.

88. A paste composition as recited in Claim 84, wherein said first non-metallic phase comprises a metal oxide.

89. A paste composition as recited in Claim 84, wherein said first non-metallic phase is dispersed throughout said metal phase.

90. A paste composition as recited in Claim 84, wherein said first non-metallic phase is a metal oxide selected from the group consisting of Al_2O_3 and SiO_2.

91. A powder batch as recited in Claim 84, wherein said first non-metallic phase is a dielectric compound selected from the group consisting of titanates, zirconates, silicates, aluminates, tantalates and niobates.

92. A powder batch as recited in Claim 84, wherein said first non-metallic phase comprises carbon.

93. A paste composition as recited in Claim 84, wherein said composite gold metal particles comprise at least about 0.1 weight percent of a metal oxide.

94. A paste composition as recited in Claim 84, wherein said composite gold metal particles comprise from about 0.2 to about 35 weight percent of a metal oxide.

95. A thick-film paste composition suitable for screen printing onto a substrate, comprising:

a) a binder phase;

b) an organic vehicle phase; and

c) a functional phase, said functional phase comprising coated metal particles having a weight average particle size of not greater than about 5 μm, said particles comprising a metal phase having at least about 50 weight percent gold metal and further comprising at least a first coating substantially encapsulating said particles.

96. A paste composition as recited in Claim 95, wherein said coated metal particles have a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size.

97. A paste composition as recited in Claim 95, wherein said particles are substantially spherical.

98. A paste composition as recited in Claim 95, wherein said metal phase comprises at least about 90 weight percent gold metal.

99. A paste composition as recited in Claim 95, wherein said first coating comprises a metal oxide.

100. A paste composition as recited in Claim 95, wherein said first coating is a metal coating.

101. A paste composition as recited in Claim 95, wherein said first coating comprises an organic compound.

102. A paste composition as recited in Claim 95, wherein said first coating comprises a monolayer coating.

103. A paste composition as recited in Claim 95, wherein said first coating improves

the dispersion of said particles in said paste.

168. An intermediate component for a microelectronic device, wherein said component comprises an insulative substrate and a thick film paste disposed on said substrate, said thick film paste comprising gold metal particles having a weight average particle size of not greater than about 5 μm and a particle size distribution wherein at least about 90 weight percent of said particles are not larger than twice said average particle size and wherein said gold metal particles comprise crystallites having an average crystallite size of at least about 40 nanometers.

169. An intermediate component as recited in Claim 168, wherein said substrate comprises a ceramic.

170. An intermediate component as recited in Claim 168, wherein said substrate is a green ceramic sheet.

171. An intermediate component as recited in Claim 168, wherein said substrate is a sintered ceramic substrate.

172. An intermediate component as recited in Claim 168, wherein said weight average particle size is from about 0.3 μm to about 1.5 μm.

173. An intermediate component as recited in Claim 168, wherein said thick film paste is adapted to form a plurality of conductive traces disposed in substantially parallel relation and having an average pitch of not greater than about 25 μm.

174. An intermediate component as recited in Claim 168, wherein said microelectronic device is a multichip module.

175. An intermediate component as recited in Claim 168, wherein said microelectronic device is an oxygen sensor and wherein said substrate comprises a ceramic compound selected from the group consisting of ZrO_2 and TiO_2.